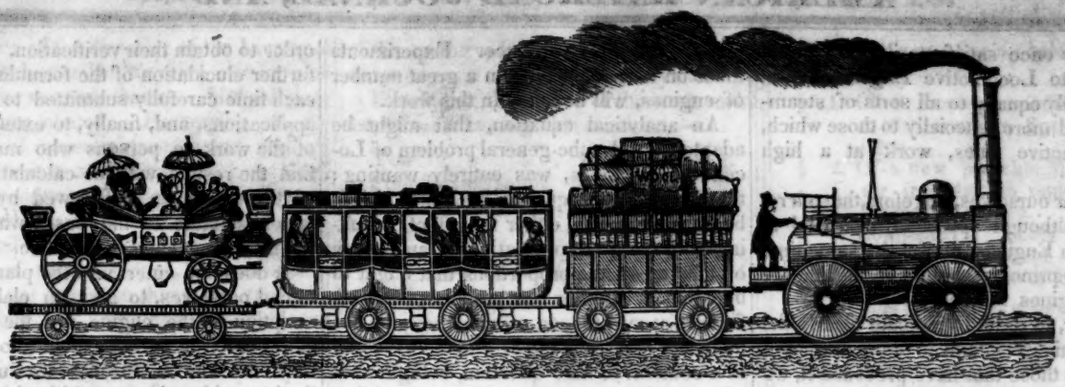

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MAY 14, 1836.

HARTFORD AND NEW-HAVEN RAILROAD.

PROPOSALS will be received until the tenth day of June next, at the Engineer Office of the Hartford and New-Haven Railroad, corner of Collis and East streets, New-Haven, for grading eighteen miles of this Railroad, from New-Haven to Meriden. On and after the 25th day of the present month, maps and profiles of the different sections may be seen at the office, together with specifications and plans of the proposed constructions. ☞ Contractors not personally known to the Engineer, must accompany their proposals with suitable certificates or recommendations.

ALEX'R C. TWINING, Engineer.

May 16, 1836. 19-tj10

The number of workmen employed in the different cutlery manufactories in France amounts to 50,000. Fan-making employs 4,000 workmen, but this branch of manufacture is peculiar to Paris and a few villages in the environs of Beauvais.

Pambour on Locomotives.—We referred in our last to a recent work by Chevalier de Pambour, on "*Locomotive Engines*, upon Railways." We now commence its republication in the Journal; but are compelled to defer the Engravings until our next. There are 33 distinct Figures or Engravings—which will cost over *one hundred dollars*, yet of so much importance do we consider the work, that we intend to defer most other matters for a few weeks, and republish the work entire in the Journal, and also in octavo form, and put them up in such a manner as to send them by mail to any part of the country, at $2 per copy, one half the price of the English edition, or *three* copies for $5. It will be ready for delivery in five weeks, or about the 15th of July. This work will probably lead to important investigations and experiments in this country. We bespeak for it an attentive perusal, and for this *Journal* the opportunity of publishing the result of such experiments and investigations as may be made in consequence of its publication.

INTRODUCTION.

There exists no special work on Locomotive Engines. Two writers, Wood and Tredgold,* have indeed, in England, slightly touched upon that matter, but only in a subordinate manner, in treatises on railways; and besides, they both wrote at a time when the art was scarcely beyond its birth. Consequently their ideas, their calculations, and even the experiments they describe, have hardly any relation to the facts which actually pass before our eyes, and can be of no use to such as wish to acquire a knowledge of these engines and their employ on railways.

Many questions had not even been entered into, others had been solved in a faulty manner. New researches on the subject became therefore indispensable. This work will, in consequence, be found completely different from any thing that has been published hitherto. No facts will be quoted, but such as result from actual observation; no experiments related, but those made by the author himself, on a new plan and with new aims; finally, no theory exposed but such as is derived from those experiments.

If at first sight it appear astonishing that no theory of Locomotive Engines should exist, the surprise ceases on considering that the theory of the steam-engine itself, taken in general, has not yet been explained. It was natural to suppose, that, respecting a machine at present in such universal use, and on a subject of such importance, every thing had been said. and every explanation given long ago. Far from this being the case, however, not even the mode of action of the steam in these engines has been elucidated. In the absence of such indispensible knowledge, all theoretical calculations were impossible. Suppositions were put in the place of facts. In consequence, we have seen very able mathematicians propose, on the motion of the piston in steam engines, analytical formulæ, which would certainly be exact, if all things went on in the engine as they suppose; but which not being founded on a true basis, fall naturally to the ground, in presence of facts.—From this also results that, in practice, the proportions of the engines have only been determined by repeated trials, and that the art of constructing them has proceeded hitherto in the dark, and by imitation.

Locomotive Engines being first of all steam-engines, we cannot advance in the researches we undertake, without solving at the same time the question relating to steam-engines in general. There is even a remarkable point to be observed, which is, that of all sorts of steam-engines, locomotive ones are those which in their application have to overcome the least complicated resistance, and the most susceptible of a rigorous appreciation. This circumstance renders them therefore more proper than any others, for furnishing an explanation of general facts common to all those machines,

* "A Practical Treatise on Railroads, and Interior Communication in general, by Nicholas Wood." First edition, London, 1825; 2d edition, London, 1832.

"A practical Treatise on Railroads and Carriages by Thomas Tredgold," London, 1825.

The theory once satisfactorily established in regard to Locomotive Engines, will of course, apply equally to all sorts of steam-engines, and more especially to those which, like locomotive ones, work at a high pressure.

We flatter ourselves, therefore, that our researches, although apparently confined to Locomotive Engines, may at the same time illustrate he principal points of the theory of steam-ngines in general.

However, in order to indicate clearly the design of this work, and to show in what it differs from those that have preceded it, we think proper to enter here into some particulars as to the points on which we have new researches to offer, either theoretical or experimental. It will be seen that those points embrace nearly the whole subject.

The pressure of the steam in the boiler, had been till now considered as invariable in every engine. It was calculated once for all, and by approximation, according to the weight on the valve. A great number of observations will show, however, how much it varies during the motion of the engine, and how necessary it is to take that circumstance into consideration, and to make use of a more exact mode of determination, lest the calculation should be entirely founded on an erroneous basis.

On that subject there will be found in our work, an alteration we propose making in the present disposition of the spring-balance, in order that it may show the true pressure; and also the description of a portable instrument we suggest for superceding the mercurial guage, and which may be adapted to any engine.

The friction of the wagons was, until now valued much too high. This error naturally rendered every calculation false, by misleading with regard to the true resistance overcome by the engines. A great number of experiments on wagons, with or without springs, alone or united in considerable trains, will show the real value of the friction.

The resistance of Locomotive Engines was still an unsolved question. We have endeavored to determine it by three different processes, which may serve to verify each other.

The additional friction created in the engine by the load it draws, had never yet been submitted to any investigation. We shall present numerous experiments on that subject.

The exact determination of the pressure of the steam in the cylinder, was necessary to explain the mode of action of Locomotive Engines, as well as that of steam-engines in general, and to calculate the work they perform in different circumstances. The erroneous ideas admitted in that respect, were the origin of all the faulty calculations, which experiment contradicted. We trust that the simple elucidation of that point will in a manner lay open the whole play of the engine.

The evaporating power of the engines was an element on which no experiment had yet been made, which was not even introduced in the calculations, and on which, however, definitely depends the effect these engines are able to produce. Experiments made on that subject, upon a great number of engines, will be found in this work.

An analytical equation, that might be adapted to solve the general problem of Locomotive Engines, was entirely wanting; that is to say, an equation by which might be known a *priori*, either the effects resulting from the given proportions of an engine, or, *vice versa*, the proportions that ought to be adopted, in order that predetermined effects in regard to load or speed may be obtained. The trials hitherto made to come to a solution of this question, being founded on a false principle, had produced formulæ in evident contradiction with facts. A rule had even been adopted, according to which the practical power of an engine was considered as equal to the third part only of its calculated or theoretical power; whereas, the whole applied power must evidently appear in the effect produced, and we shall see that it really does appear in it. This imaginary rule is a sufficient proof of the error of the calculations that were used, and could only lead to disappointments in practical applications. Engines were constructed, but the effect that they would produce was unknown. By the introduction of a new element of calculation, wrongly neglected until now, viz. the evaporating power of the engines, it will be seen that that question is solved in the most simple manner possible. From that equation, and simply by measures taken on the machine, the velocity and load of a Locomtive Engine may be immediately found, and *vice versa*, the proportions which ought to be given to it, to make it answer any intended purpose. A great nnmber of experiments, made in a daily practice, will show the accuracy of the formulæ. This is, at the same time, the theory of all high-pressure steam-engines.

Several secondary dispositions of the mechanism of the engines had not yet been studied. It will, however, be seen that they are apt to deprive the machine of as much as a fourth part of its power. The effects of these dispositions, and in particular of that which is called the *lead of the slide*, will be submitted to calculation, and the results verified by special experiments.

The resistance proper to the curves of the railway deserved also to fix our attention. We shall endeavor to fix accurately the form of the wheels, and the disposition of the rails, by which that resistance may most effectually be remedied.

The consumption of fuel according to the load had not been determined in a satisfactory manner, and the rule proposed was contradicted by the experiment. This question will be established in a different manner, and the results confirmed by facts.

The researches on those points were made on twelve different engines, and numerous experiments were undertaken on each branch of the subject.

The method constantly followed consists in taking, first, the primary elements of the question from direct experiment; then making use of those elements to establish a calculation in conformity with theoretical principles; and, lastly, submitting the results to fresh and special experiments, in order to obtain their verification. For the further elucidation of the formulæ, they are each time carefully submitted to particular applications, and, finally, to extend the use of the work to persons who may wish to find the results without calculations, each of these formulæ is followed by *practical* tables, suitable to the cases which occur the most frequently in practice.

It does not enter into the plan we have traced ourselves, to give an elaborate description of the engine, nor the measures of its different parts, except those necessary for the researches we undertake. Such considerations would lead us too far, and concern more particularly works on construction. In like manner, the figures added to our work, are only meant as illustrations of the text. They would be too imperfect for any other object.

The untrodden path in which we have been forced to enter, may have led us into some error. We by no means pretend to have produced a perfect work, and we claim indulgence for the mistakes which may have escaped us in so new a subject. Our chief aim was to be useful, while seeking a study congenial to our taste, and occupying the leisure of an inactive life. Early devoted to other pursuits, belonging to a family for several generations engaged in the military career, and the son of a General of Artillery, whose footsteps had naturally traced our direction, our studies would not have taken that turn, had we not been struck by the powerful effects of the moter we are going to describe, and by the important part it must necessarily act in modern civilization. We thought our work would at least have this result, to call the public attention on the subject. We shall feel happy if we have succeeded in some of our researches; and happy also if others, in correcting our errors, shall at least elucidate the facts upon which we have called their attention.

All the experiments related in the work were made by *ourselves*, with all the care and attention they required. Some were made in company with engineers of known talent and ability, as Mr. J. Loke, of the Grand-Junction Railway, and Mr. King, of the Liverpool Gas-Works. We give them in all their details, with a view that every one may judge of their accuracy; and we mention the place and date of each experiment, in order to facilitate their verification by referring to the books, on which is registered the weight of each of the trains.

In regard to the facility we had of making these numerous experiments, we must say that, having applied to the heads of the most important undertakings of the sort in England, we were permitted, without restriction, to penetrate into the workshops, to take every measure, to collect all the documents concerning the expenses, and lastly, to make any experiment that appeared necessary to us.

It is with pleasure we acknowledge in the English character the liberaltty we have found in the whole course of our investigations.

To the friendship of Mr. Hardman

Earle, one of the directors of the Liverpool and Manchester Railway, we owe in particular our warmest thanks. His obligingness never abated. Possessing all the qualities of an enlightened mind, he liked taking a part in researches which appeared to him conducive to the progress of science; and he permitted us to use all the engines and wagons of the railway. The beauty of these engines, their number, which is not less than thirty, the care with which they are kept, and the immense trade on that line, which gives the facility, without interfering with the business of the railway, to select loads for experiments as considerable and as light as one wishes, make that place the only one, perhaps, in the world, where experiments on a great scale may be made with the same precision as in general can only be obtained by a small apparatus. It is for that reason we preferred that railway to any other at present in activity, either in France or in England.

The same facilities were also offered us by the directors of the Darlington Railway. Interesting documents concerning the repairs and expenses of all sorts, incurred by that company, were obligingly communicated to us. We owe that obligation to the liberal authorisation of Mr. J. Pease, M. P., chairman of the company, and the unremitting attentions of Mr. Robert B. Dockray.

We have studied the subject with all the interest, and, we might say, with all the enthusiasm it excited in us. In fact, what a subject for admiration is such a triumph of human intelligence! What an imposing sight is a Locomotive Engine, moving without effort, with a train of 40 or 50 loaded carriages, each weighing more than ten thousand pounds! What are henceforth the heaviest loads, with machines able to move such enormous weights? What are distances, with moters which daily travel 30 miles in an hour and a half? The ground disappears, in a manner, under your eyes, trees, houses, hills, are carried away from you with the rapidity of an arrow; and when you happen to cross another train travelling with the same velocity, it seems in one and the same moment to dawn, to approach, and to touch you; and scarcely have you seen it with dismay pass before your eyes, when already it is again become like a speck disappearing at the horizon.

On the other hand, how encouraging is the evident prosperity of those fine establishments. How satisfactory it is to acquire the proof that the Liverpool Railway produces 9 per cent. interest, and the Darlington one an equal profit! With what confidence must we not anticipate the future state of such undertakings, when we know that, besides the above-mentioned annual interest, the shares of the Liverpool Railway have risen, in four years,* from £100 to £210; and those of the Darlington Railway, in eight years, from £100 to £300? What may not society at large expect in future from this new industry, which will augment, ten-fold, the capital and produce of the country, by the immense influence of speedy and economical conveyance!

We shall in the course of the work make use of the following abbreviations:—

Ton	t.
Pound avoirdupois	lb.
Foot	ft.
Square foot	sq. ft.
Cubic foot	c. ft.
Inch	in.
Pound sterling	£.
Shilling	s.
Penny	d.

* The first edition of this work appeared in French, in the beginning of 1835.

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A PRACTICAL TREATISE ON LOCOMOTIVE ENGINES.

The plan we intend to follow in the course of this work will, we hope, render it both clear and methodical.

We shall begin by the description of a locomotive engine; and we shall acquaint the reader with the means by which the pressure of the steam may be accurately measured, so that, before we go any father, he will be able to see the elements from which the power of the mover we are to employ is derived.

Our attention will afterwards be directed towards the resistances which that mover must overcome in its motion, so that we shall successively endeavour to discover as well the resistance of the waggons, as that which belongs to the engine itself, either when it moves alone, or when it draws a load after it.

These points first established, we shall pass to the general theory of the movement of locomotive engines, and we shall lay down the formulæ by which to determine, *a priori*, either the speed the engine will acquire with a given load, the load it will draw at a given speed, or the proportions which are to be adopted in its construction to make it answer any intended purpose.

After that, we shall have to consider several additional dispositions proper to the engine, which may exereise more or less influence on the expected effect; and we shall then also treat of some external circumstances, the result of which may be of the same nature.

Lastly, we shall speak of the fulcrum of the motion, or of the force of adhesion of the wheel to the rails; and our last chapter will contain a calculation of the quantity of fuel required for the traction of given loads.

These inquiries will be sufficient to solve all the most important questions concerniug the application of locomotive engines to the draft of loads.

They will sometimes be necessarily subdivided into several branches, and require calculation and theoretical illustrations of more or less extent, though always plain and easy, and a series of experiments more or less numerous; but we shall take care to maintain, all along our work, the classification we at present lay down.

CHAPTER I.

DESCRIPTION OF A LOCOMOTIVE ENGINE.

ARTICLE. I

ENUMERATION AND DESCRIPTION OF THE PARTS.

Figure 1 represents a locomotive engine constructed on the most approved principle. Its mechanism is so simple, that a short description will be sufficient to explain its mode of acting. Whatever may appear unsatisfactory in this first sketch, will be cleared up by the particulars we shall have occasion to add in the course of the work.

The principal parts of the engine are: the fireplace and boiler, which constitute the means of raising the steam; the slides and cylinders which are the means of bringing into action the elastic force residing in that steam; and the cranks and wheels, by means of which the motion is transferred from the piston to the engine itself. When we have described those principal parts, we shall pass to some others of less importance, and then we shall fix the particular place each of those parts occupying in the engine.

§ 1. *Of the Boiler.*

Figure 3 gives a complete idea of the boiler.

It shows the body of the machine, composed of three distinct compartments. The one to the right, or fronting the machine, and which is surmounted by the chimney C, is separated from the two others by a partition *tt*, The two others together form the boiler. Both are filled with water to a certain height *cd*, but part of their internal space is occupied by the fire, as will be explained.

In the hindmost compartment is placed a square box *e*, which contains the fuel, or forms the fireplace of the machine. Between the sides of that box and those of the compartment in which it is contained, a space *qq* is left, which communicates freely with the remainder of the boiler, and which is consequently filled with water. The inner box is supported in the compartment in which it is contained, and joined to it by strong bolts, having the advantage of giving solidity to that part of the boiler which, not being rounded, offers less resistance than the cylindrical parts.

The fire-box *e*, being thus placed in the middle of one of the compartments of the boiler, would be surrounded on all sides with water, were it not for the aperture *l*, which forms the door of the fire-place, and the bottom, *nn*, of the box which is occupied by a grate, one of the bars of which is represented at *nn*. This grate is more plainly seen in fig. 4 which represents the same fire-box seen in front.

Near the door *l*, and in the machine, is placed a strong supporting board, represented in fig. 1, by BB. The use of this board is for the engine-man to stand upon. Directly behind the machine comes the tender carriage for coke and water, so that it is easy for the fireman to throw coke in the fire by the door *l*, and to let water pass in the boiler whenever it may be necessary. This supply of water takes place by means of a forcing-pump, put in motion by the engine itself, and of which we shall speak hereafter.

The lower part, *nn*, of the fire-place is occupied, as we have said, by a grate, and remains consequently open, admitting the external air required for the combustion of fuel. The coke thrown into the fire-box, falls on the grate and is supported by it. When the fire is lit, and the door of the fire-box shut, the flame of the combustible remains confined in the fire-box. It would have no egress, if a number of small tubes or flues *e'e'*, the disposition of which is better seen in fig. 4, were not to lead the flame to the chimney, after passing through the whole length of the second compartment or cylindrical part of the boiler.

From that construction it will easily be conceived, that the fire being shut up in the fire-box, and completely surrounded with water, none of its calorific parts are lost. Afterwards, the flame, in its way to the chimney, divides itself among all the small flues we have mentioned. It crosses thus the water of the boiler, having a considerable surface in contract with it, and only escapes after having communicated to the water as much as possible of the caloric it contained. Once arrived at the extremity *e''* of the tubes, the flame is in the compartment of the chimney, and escapes freely through the chimney C.

We see thus the heat applied here in two very distinct manners. All the water which surrounds the fire-box is in immediate contact with the fuel, and consequently subject to the action of the radiating caloric; on the contrary, the water which is placed in the middle compartment, receives its heat only from the contact of the flame and heated air which escape from the fire-box, so that it is exposed only to communicative heat.

It may be necessary to observe here, that the form of a boiler, with tubes, a form to which is undoubtedly owing the surprising power of the present locomotive engines, is a French invention. This ingenious idea belongs to M. Seguin, civil engineer and manufacturer in Annonay.*

§ 2. *Of the Action of the Cylinders.*

The second important part of the engine is the apparatus of slides and cylinders. Fig. 3 is also desinged to show the disposition of this part.

In the upper part of the boiler, that is to say, in the part occupied by the steam, there is a large tube VV', which is open at one of its ends and leads out of the boiler. It is by this tube that the steam is conducted into the cylinders. At V', in the interior of the tube, is a cock or regulator, the handle T of which extends out of the machine. By turning that handle more or less, the passage for the steam may be opened or shut at will.

The steam, being thus generated in great abundance in the boiler, and being unable to escape out of it, acquires a considerable degree of elastic force. If at that moment the cock V' is opened, the steam, penetrating into the tube by the aperture V, follows it to the entrance *v* of the valve-box. There a sliding valve *x*, which moves at the same time with the machine, opens a communication to the steam successively with each end of the cylinders. These are placed horizontally at the bottom of the chimney compartment, where the passage of the flame and the sides of that compartment protect them against the condensating effect of the cold air, and keep them in a proper degree of heat.

The direction of the arrows in the figure mark the line of circulation followed by the steam, from its entrance at the aperture V, into the slide-box. In the situation in which the slide is here represented, passage 1 is open to the steam, and consequently the piston is pushed in the direction of the arrow. At the following instant, passage 2 will be open in its turn, and the piston will be pushed in the contrary way. When the steam has produced its effect, it passes in the tube *v'*, and is conveyed by it to the chimney, through which it escapes into the atmosphere.

The introduction of the steam takes place at V, at a point purposely elevated, that the bubbling and jolting of the engine may not let the water of the boiler get in by the opening V.

§ 3. *Of the Cranks and Wheels.*

The piston-rods being set in motion according to the foregoing explanation, and sliding in guides which prevent any deviation from a rectilinear horizontal motion, communicate a rotatory movement to the axle of the two hind wheels of the engine. This transformation of the alternate motion into a circular one, takes place after the manner of the common foot spinning-wheels, by means of a crank in the axle. This effect is clearly represented in fig. 3. There the steam may be seen forcing alternately the piston backwards and forwards, and turning the crank *yz*, and at the same time the axle and the wheel which is fixed to it. However, as in the motion of a crank, there are two points in which the alternate force that puts the crank in motion, has no greater tendency to move it in one direction than in another, which takes place whenever the radius of the crank happens to be on the centre, that is to say, in the direction of the alternate motion; the two cranks respectively corresponding with the two pistons, are placed at right angles to each other. By that means one of the two has always its full effect whenever the other ceases to act, and the power of the engine never varies. The two cylinders being, as we have already said, placed beneath the boiler, the piston-rods communicate directly under the engine with the above-mentioned cranks as appears in the figure. The crank-axle being set in motion, the wheels, which form one body with it, turn at the same time and,

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* M. Seguin's patent bears the date of the 22d of Feb. 1828; and it was not until April 25, 1829, that the committee of directors of the Liverpool Railway called the attention of the English mechanicians towards locomotive engines, by proposing a prize on the subject. On October 6, of the same year, 1829, and not before, appeared the ROCKET engine of Messrs. Stephenson and Booth, the principle and even the form of which differ in no way from M. Seguin's patent. We do not wish to detract from Mr. Booth's merit in having also conceived that happy idea. It is not the first time that two ingenious persons have had the same thought; but, by the above-mentioned dates, it will be seen that the prior claim rests, nevertheless, with the French engineer.

The fact may be easily verified in England, by looking for a description of the patent in some of the following works, which are certainly to be found in the British Museum and other chief English libraries: Annales de l' Industrie Francaise et Etrangere, ou Recueil Industriel et Manufacturier, annee 1828; Bulletin de la Societe d'Encouragement pour l' Industrie Nationale, annee 1828; Description des Machines et Procedes consignes dans les Brevets d' Invention, de Perfectionnement et d' Importation, publiee d' apres les Ordres du Ministre de l' Interieur et du Commerce. This last work we quote in advance, as it only gives the description of expired patents; M. Seguin's will not be mentioned until the year 1838.

the engine is propelled in the same manner as a carriage which would be set a-going by turning the wheels round by the spokes.

The only fulcrum of the motion being in the adhension of the wheels to the rails that support them, which adhension causes them to advance instead of slipping round, it might appear doubtful whether, on such an even surface as the rails of a railroad, the engine could advance by means of the sole rotatory movement imparted to its wheels, particually when the engine has to draw a considerable weight. But experience proves that however slight the adhesion of a wheel to a well-polished rail may appear to be, as, on the other hand, the power required to draw a load on a railroad is very small, that adhesion is sufficient, and the engine progresses, followed by its whole train.

In ordinary cases, the adhesion of two wheels is sufficient; particularly with engines, the weight of which is distributed so that the drawing-wheels bear about the two-thirds of it. When a great power of adhesion is required, the four wheels are made equal. In that case one may, if necessary, connect the two wheels of the same side together, by metallic rods placed on the outside of the wheels. One of these connecting-rods is represented in fig. 6. C is the prolongation of the axle beyond the wheel. The crank-arm Co is fastened to that prolongation of the axle, and must necessarily turn with it. The point *o* is a ball and socket joint; *m* is a cotton-wick syphon, by which the oil is fed in the joint; *nn* are keys designed to lengthen or shorten the rod, which at its opposite end is joined in the same manner to the crank-arm of the other wheel. The natural result of this is, that when the wheel or the axle C turns, it carries along with it the crank-arm Co, and thus communicates the same motion to the other extremity of the connecting-rod, and by it to the crank-arm of the second axle. Thus the power of the engine is communicated by the two hind wheels to the two others, and the engine then adheres by its four wheels.

In order that, while in motion, the engine may not slip off the rail, which, we know, are iron bars projecting above the ground, the wheels have, on the inner side, a flange that prevents any lateral motion. But as, on the other hand, that flange ought not to be in danger of constantly rubbing against the side of the rail, the tire of the wheel is not exactly cylindrical, but slightly conical. Its diameter is a little larger on the side of the flange than on the outward side; the consequence of which is, that, supposing the engine were to be for a moment pushed to the left, the left wheel, resting on its broadest part, would pass over more way than the right wheel, and by that means bring the engine back to its true place between the rails. Wheels of such a form may be seen in fig. 2.

§ 4. *Of the Safety Valves.*

The three preceding points form the foundation on which the action of the engine rests; the other parts are only secondary ones, that is to say, only designed to make the power produced by the former ones efficient. The boiler has two safety-valves E, F (fig. 1), one of which is sometimes shut up in a box, to put it out of the reach of the engine-man, and to prevent him from overcharging it, as he might be tempted to do in order to obtain from the engine a greater effect, even at the risk of damaging it. More commonly, however, that precaution is given up, on account of its inconvenience.

§ 5. *Of the Water-Gauge.*

A gauge is likewise fixed to the machine to show at what height the water stands in the boiler. This gauge is a glass tube, *mn* (fig. 7), inchased at both its ends in two verrels *aa*, with cocks communicating with the interior of the boiler and appearing outside, as may be seen in the figure. When the two cocks *rr* at the top of the tube are opened, the water penetrates into the tube and takes the same level as in the interior. The cock S is designed to let that water afterwards run off. The use of this instrument is, that the engine-man may know when it becomes necessary to let the apparatus be refilled from the tender. As, however, the tubes and other parts of the boiler begin to suffer, that is to say, are apt to crack, when the water gets too low in the machine, there are, for more safety, on the side of the boiler, two and sometimes three small cocks, placed at different heights; by opening which, one after the other, the level of the water in the interior may be still more positively ascertained. If it be necessary to know at what height the water stands in the boiler, it is not less so to be certain of the real degree of elastic force the steam possesses; for, should that force not be sufficient, the engine would be unable to accomplish its task: but as this point requires to be explained at some length, we shall at a further period make it the subject of a chapter by itself.

§ 6. *Of the Slides.*

We have another important object to clear up. We have said above, that the slide-valve admits successively the steam above and below the piston of each cylinder, the result of which is the alternate motion, source of the final progressive motion of the engine. The engine-man then having opened the regulator or cock that admits the steam into the pipes, the steam proceeds from the boiler through the tube *v*, (fig. 8) to the valve-box, and, pressing with all its force on the upper part *x* of the sliding-valve, compels it to remain in immediate contact with the plane in which it slides, while performing its motion. When the slide is in the situation in which it is represented in the figure, the steam takes the way marked 1, acts upon the piston, and pushes it in the direction of the arrow. In the meanwhile, the steam under the piston escapes through the passage 2, which then communicates with the exterior, by means of the aperture *e*. When this first effect has been produced, the slide, by means of its rod *l*, is pushed in the position marked by the dotted lines. Then, on the contrary, it is the passage 2 which is open to the steam coming from the boiler; it pushes, consequently, the piston in the opposite direction to its first motion; while the passage 1, communicating in its turn with the aperture *e*, gives free egress to the steam that has produced its effect. The alternate motion continues thus: the slide passing from one position to the other, by which it opens and shuts successively the passages, so that the steam may act alternately above and below the piston. The steam is afterwards led to the chimney, as will be explained hereafter, there to augment the current of air by which it causes the draft of the fire.

The motion of the slide is regulated so as to accompany the motion of the piston, but still to precede it by a very short instant: that is to say, that instead of opening the proper passage for the stroke of the piston just at the moment the piston is going to begin that stroke, it opens it a little beforehand. This is called giving a little *lead* to the slide. By that means, at the moment the piston begins its motion, the steam has already its full action upon it. We shall have occasion to come back to this point, when we shall see that this disposition, which is favorable to the speed of the engine, can be advantageously employed only within certain limits, beyond which it would be prejudicial to the load the engine is able to draw.

§ 7. *Of the Eccentric Motion.*

The alternate motion of the slide is performed by the steam itself. To comprehend this point requires some attention.

An eccentric wheel is fastened to the axle, and, as this turns, the eccentric, drawn along by its motion, pushes and draws alternately the rod of the slide.

This effect is represented in figs. 9 and 10. The point O is the centre of the axle, of which the section appears hatched. The point *m* is the centre of the eccentric, hatched in a contrary direction. The axle, in turning, draws the eccentric along with it, and makes, consequently, the point *m* describe a circle round the point O. In that motion the point *m*, passing successively to the right and to the left of the centre O, must necessarily, by means of the ring *nn*, which encircles the eccentric, push and draw alternately the shaft L, which acts upon the slide.

On the other hand, the point C representing the extremity or throw of the crank of the axle, which is set in motion by the piston, it will appear that when the steam-pushing the piston from one end of the cylinder to the other, makes the crank revolve half way round, the axle makes also the half of a revolution round itself; so that the point *m* describes the half of a circumference round the point O, and consequently the eccentric pushes the shaft L, and by it the slide-rod *l*, from one of their extreme positions to the other.

Thus placed, by this first operation, the slide now admits the steam on the opposite side of the piston. The piston then goes back, makes the axle revolve again half way round, whereby the slide is brought back to its original position, which suits the next stroke of the piston; and so forth.

The effect of drawing and pushing altenrately the slide-rod by means of the rotation of the eccentric, is accomplished by means of a metallic ring *nn* fixed at the end of the shaft L, and in which the eccentric-wheel turns, the surfaces which are in contact being smooth and lubricated with oil. By this arrangement, while the great radius of the eccentric passes in turning from one side of the centre to the other, it carries along with it the shaft fastened to the ring, and communicates to that shaft the alternate motion.

By this it will be seen that the eccentric wheel acts here the part of a common crank for transforming the circular motion of the axle in an alternate motion applied to the slide, on the contrary principle to that which changes the alternate motion of the piston into a circular motion applied to the axle of the engine; but the eccentric dispenses with the crank which would have been necessary in the axle.

However, as by the disposition of the engine the slide-rod is not in the same plane with the axle, the eccentric does not communicate directly the motion to the slide-rod itself; the motion is communicated to that rod by means of the cross-axle K, and the two arms KL′ and K*l*′ which are fixed to it; and the consequence is, that when the eccentric goes back, the slide-rod *l* advances, and *vice versa*, as may be seen on the figure.

A comparison between figs. 9 and 10, the difference of which is a quarter of a revolution, will make the above mentioned effects perfectly intelligible.

By examining the motion of the slide (fig. 10.,) it will be seen that, while passing from one of its situations to the other, and when it happens to be exactly in the middle position, there occurs one instant during which all the passages of the steam are shut together. This effect takes place at the moment the slide changes the passages of the steam, and corresponds with the point where the piston changes its direction. This coincidence can only take place because, setting aside the little lead of the slide, the radius of the eccentric is at right angles with the radius of the crank. In fact, the slide is necessarily thus in its middle position, that is to say, changing the communications of the steam, at the same time as the piston is at the bottom of the cylinder, ready also to alter the direction of its motion. This correlativeness of motions is clearly exhibited in the figure.

The particular advantage of the eccentric being thus placed at right angles with the crank is, that the eccentric is in full action when the crank is on its centre, or the piston at the bottom of the cylinder, that is to say, that the slide is in its most rapid motion just at the moment that it is to open or shut the passages; which circumstance is necessary to prevent time being lost in the alternate effect of the steam.

§ 8. *Of the Drivers.*

Until now we have spoken as if there were only one slide, but, having said there were two cylinders, it is clear that there must be a slide, and consequently an eccentric for each of them. On the other hand, the two pistons alternating one with the other in their motion, that is to say, acting upon two cranks perpendicular to each other, as hss been explained, the radii of the two eccentrics must necessarily stand also at right angles with each other. This disposition may be seen in figs. 11 and 12, where the piece forming the two eccentrics is represented in front. To make it more clear, it is marked by hatchings.

This piece must, as has been said, move with and be carried along by the axle.—However, if it were permanently fixed on the axle, its position might suit when the engine is to go forward, and not when it is to go backward; for it will be seen that, for these two motions, the eccentric must be fixed in two different positions.

This piece is therefore loose upon the axle like a pulley on its axis, but it can be fastened to it at will. To that effect its side-faces have two apertures or eyes, represented at O and O′; and the axle itself carries two pins *rr*′, which are called drivers. The eccentric being placed on the axle between the two drivers, it is easy to push it by means of a lever, either against one or against the other, until it enters the aperture designed for it; so that from that moment, the eccentric may be drawn along by the axle. Moreover, if these two drivers be placed in such a manner that one may suit to the progressive, and the other to the retrograde motion of the engine, we shall, by disengaging the eccentric from the one and carrying it to the other, be enabled to make the engine go either forward or backward at pleasure.

There is no difficulty in fixing the place that the eccentric must occupy on the axle either for the progressive or the retrograde motion.

Let us suppose that, by pushing the engine gently along the rails, we bring one of the pistons to be just in the middle of the cylinder, and that precisely at the same instant the crank, on which that piston acts, is in its verticle position above the axle, as in fig. 3, it is clear that, to make the engine go forward, the steam must push the piston forwards, for then the piston will carry along with it, in the same direction, both the crank and the wheels; consequently, the slide must must admit the steam by the passage No. 1, or be drawn forward as it is represented here, which, by referring to fig. 9, requires that the radius of the eccentric be horizontal, and placed at the back of the axle. This is, therefore, the point at which the driver must fix the eccentric for the progressive motion.

The engine remaining in the same position, let us suppose that we wish on the contrary, to dispose it for the retrograde motion. The steam must arrive on the opposite face of the piston, that is to say, that the passage No. 2 must be opened to it, which supposes that the slide is pushed backwards, and consequently that the eccentric is in front. It is therefore horizontally, and in the front of the axle, that the eccentric must be fixed by means of the driver.

This is exactly the position of fig. 13. By observing the right hand crank, we see that while that crank is vertical and above the axle, the driver *r* on the right side, and the aperture that receives it, are behind and hidden by the axle; consequently, the eccentric is horizontal, and in front; a position which, as we have seen, suits a retrograde motion. The driver *r* is thus placed for the retrograde motion, keeping the eccentric in that position.

If we now suppose, on the contrary, that the eccentric be pushed against the other driver *r*′, the corresponding aperture of the eccentric being at O′, that is to say, not being in front of the driver, the consequence will be that, the eccentric not stirring out of its place, the axle will be forced to turn half round before the driver can enter into the aperture. From this follows, that, if we continue to examine the right crank, it will be found to have arrived *under* the axle, while the eccentric will still be in front, which is the position that suits the progressive motion; for it is the same as the one we have explained above, of the crank being above the axle, and the eccentric behind.

Thus we see that the two driver *r*′ and *r*, in figs. 11 and 12, being placed at right angles with each other, and with the cranks of the axle, are in a proper position; one for the progressive, and the other for the retrogade motion of the engine.

These two drivers being fixed on the axle, one on one side, and the other on the other side of the eccentric, it is clear that, by pushing that eccentric, by means of a lever, either on one or on the other of the two drivers, the effect of the steam on the piston will immediately be to carry the engine either forwards or backwards, according to the driver with which it has been thrown in gear. The lever, which causes the change of position of the eccentric, is placed in such a manner as to present its handle within the reach of the engine-man, on the board on which he stands.

Besides these several dispositions, in order that the man who directs the engine may himself and of his own accord move the slides, independently of the motion of the axle, the shafts of the eccentrics are not invariably fixed to the slide rods. They are only fastened to them by a notch L′, figs. 13 and 14. By means of a lever acting on the small rod *m′ o*, the engine-man can raise the shaft of the eccentric and disengage it from the the notch, as may be seen in fig. 14; then the slides are at liberty to move independently of the axle; consequently, it is easy by means of two handles represented by PP in fig. 1, and connected with the slide-rods, to give to those slides the required motion.

§ 9. *Of the Water-Pumps.*

Under the body of the engine are two pumps *p*, fig. 1. the use of which is to replenish the boiler with water. Each of them is placed immediately under the piston-rod of each cylinder, and is worked by it. Each pump sucks a part of the water of the tender into the cylinder of the pump, and, on the other hand, forces it from the cylinder of the pump into the boiler, in the usual way. By having two pumps the replenishing of the boiler is secured, as, in case one of the two were to get out of order, the other may easily supply its place.

The valves of these pumps are ingeniously made of a small metallic sphere, resting on a circular seat, on which it exactly fits. Their action takes place by rising within a cylinder, the sides of which are pierced with four apertures for the passage of the water. One of these valves is represented in fig. 15. The water is introduced through *a* from the interior of the cylinder under the sperical ball which it raises, and is diffused in the body of the pump by the apertures *b*, *b*. This form of a valve never misses its effect; and the pumps, which, in the beginning, were continually out of order, are free from that defect, since Mr. Melling of Livepool first introduced that sort of valve.

§ 10. *Of the Steam-Regulator.*

The regulator, of which we have spoken above, and by means of which the passage leading from the boiler to the cylinders may be more or less opened, is represented in figs. 32 and 33. It simply consists of two metallic disks placed above and exactly fitting each other, both having an aperture of the same size. The inferior disk is immoveable, and shuts the pipe through which the steam escapes. The superior disk is moveable, by means of a handle T, which projects out of the engine; the stem r of the handle passes through the moveable disk, and enters the other in its centre, so as to keep them both in a right position over each other. In fig. 32, these two disks are distinguished from each other by hatchings running a different way. By making the superior disk K, by means of the handle T, move circularly on the inferior disk, the two apertures may be brought to correspond exactly with each other, as in fig. 32, and then the passage is entirely open. If only partially moved, as represented by the dotted lines in fig. 33, the passage is only partially opened; and when the two apertures do not correspond at all, the communication is completely intercepted: when the passage is thus shut, it is the steam itself that keeps the two disks in immediate contact with each other, by pressing with all its force on the superior disk.

This regulator may also be constructed in a different way. It is sometimes made in the form of a common two-way cock, the steam coming from above; but the preceding description is the one most commonly used.

§ 11. *Of the Joints or rubbing parts.*

In all the joints of any importance, the oil is fed without interruption by means of a cup, with a wick-syphon, placed above the joint, as at *m* in fig. 6. This cup is made in the form of a school-boy's inkhorn, so that the velocity of the motion may not spill the oil; and there is at the bottom of it a small tube, penetrating to the entrance of the joint. A cotton-wick dipping in the oil of the cup passes in the tube, and, sucking continually the oil out of the cup, drops it into the joint without interruption.

§ 12. *Of the Fire-Grate.*

The grate in the fire-place is not made of a single picce. It is formed of separate bars (fig. 31), which are placed next to each other at the bottom of the fire-place, where they are supported by their two ends. The advantage of this arrangement is, the facility it affords of replacing them individually by new ones, when they are worn out by the intensity of the fire. Besides, if any accident should happen to the boiler, and make the water run off unexpectedly, thus endangering the engine, one may, by means of a crooked poker, easily turn the bars upside down, and consequently extinguish immediately the fire by letting it fall on the road, with the bars that supported it. It is also thus that every evening the fire-box is emptied, after the engine has finished its work.

§ 13. *Of the places occupied by the different parts.*

We shall complete this description, by showing on the whole engine, as represented in figs. 1 and 2, the places occupied by the different parts of which we have spoken.

A, Part of the boiler containing the fire-box.

BB, Stand for the engine-man and his assistant.

C, Chimney of the engine.

D, Place of the cylinders.

E, First safety-valve, with lever and spring-balance, as will be explained hereafter.

F, Second safety-valve, constructed in the same manner.

G, Glass-tube.

H, Gauge-cocks.

I, End of the eccentric-rod.

J, Horizontal guides for the head of the piston-rod, so as to ensure its motion in the exact direction of the axis of the cylinder.

K, Cross-axle, communicating the motion of the eccentric-rod to the slide-rod, by means of the arms KL′ and Kl′, which are fixed upon it (see figs. 9 and 10.)

L′, Notch for throwing in gear the eccentric-rod with the cross-axle which works the slide-rods.

MM, Rod by means of which the engine-man can raise the eccentric-rod, and throw it out of gear with the cross-axle which works the slides. This is performed by means of the arms *m* and *m′* connected together. When the engine-man pulls the rods MM, he causes the arm *m′* to raise, and with it the small rod *m′o′*, which lifts the eccentric-rod out of gear with the arm KL.

N, Handle by means of which the engine-man pulls the rod MM, so as to produce the aforesaid effect.

PP, Handles to move the slides when they are thrown out of gear with the eccentrics. These handles, acting upon the cross-axle Q, move the cross-heads RR which are fixed to it. This motion is communicated by means of the rods SS to the cross-heads *rr*, which act upon the axle working the slides.

T, Handle of the regulator, to open more or less the aperture through which the steam passes from the boiler to the cylinders.

V, Steam-chamber, or reservoir, in which the steam is confined till it can escape through the aperture of the regulator, and penetrate into the cylinders.

U, Man-hole, or aperture, closed by a strong iron plate, and large enough to admit a man into the interior of the boiler, when necessary.

XX, Iron knees, by which the boiler is fixed to the frame of the carriage.

ZZ, Springs resting at *aa* on the chairs of the wheels, by means of vertical pins passing through holes in the frame of the engine. One end of the pin resting on the back of the spring, and the other on the upper side of the chair; the whole weight of the machine is thus supported by the wheels, but through the intermediate action of the springs.

bb, Guides for the chair of the wheel to slide up and down, according as the spring bends more or less under the weight of the engine. The upper part of the chair is scooped out to form a small reservoir for oil. This reservoir, as well as the above-mentioned contains a tube and a syphon-wick, for feeding constantly the oil upon the axle, at its rubbing-point with the axle-box.

c, Flexible tube made of hemp-cloth, but supported within by a spring, and through which the water arrives from the tender to the pump of the engine, when a cock fixed to the tender is opened.

p, Water-pump of the engine, which is constantly set in motion by a connexion with the piston-rod of the corresponding cylinder, but which cannot force any water into the boiler, unless a cock which lets the water come in from the tender be opened. The cock is not marked on the figure.

p′, Handle and rod of the safety-cock of the pump, serving to ascertain whether the water really arrives in the cylinder of the pump. This cock leads without, so that when it is open and the pump has its proper effect, a small jet of water may be seen issuing from it, which shows that the pump works right.

ee, Pad, stuffed with horse-hair and covered with leather, to deaden the shocks the engine may give or receive.

f, Cock, by means of which the water that is sometimes carried from the boiler to the cylinder may be forced out by the effect of the steam.

g, Opening made in the double casing of the fire-box, and closed hy a screw-bolt. In withdrawing this bolt, a cleaning-rod may be introduced into the double-casing; and, by means of a forcing-pump, water may be injected with force, to cleanse out the clay sediment left by the boiling of the water. This cleaning is usually performed once a-week.

h, (fig. 2.) Moveable plate or door, opening the interior of the chimney compartment, by which the end of the tubes of the boiler, the cylinders, the slides, and the steam-pipes leading from the boiler to the slide-boxes, or from the slide-boxes to the chimney, are visible. This door is opened when it is necessary to regulate the slides, as we shall see hereafter,

WOOD POLISHING.—The Persians have introduced an entirely new mode of polishing, which is to wood precisely what plating is to metal. Water may be spilled on it without staining, and it resists scratching in the same degree with marble. The receipt for making it is as follows:—

To one pint of spirits of wine, add half an ounce of gum shellack, half an ounce of gumlack, half an ounce of gum sundrick, placing it over a gentle heat, frequently agitating it until the gums are dissolved, when it is fit for use.

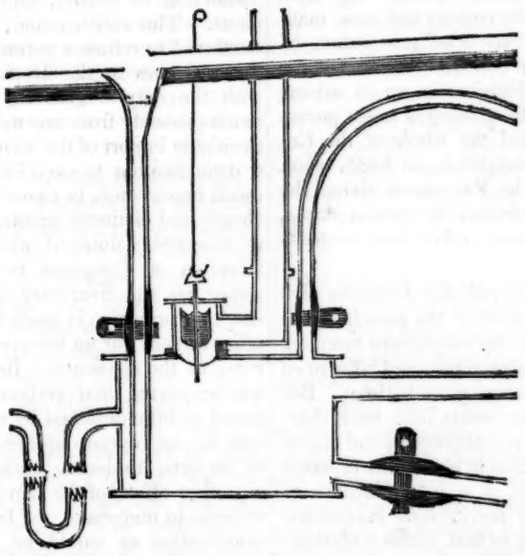
Make a roller of list, put a little of the polish upon it, and cover that with a soft linen rag, which must be slighlty touched with cold drawn linseed oil. Rub them in the wood in a circular direction, not covering too large a space at a time, till the pores of the wood are sufficiently filled up. After this, rub in the same manner spirits of wine with a small portion of the polish added to it, and a most brilliant polish will be produced. If the outside has been previously polished with wax, it will be necessary to clean it off with glass paper.

CONNECTICUT MANUFACTURES.—A correspondent informs us that the village of New Britain, in Berlin, Conn., is as famous for the manufacture of *nick nacks* as any other portion of the land of steady habits. He says there is $1,300,000 worth of little indispensibles—such as stocks, suspenders, brass castings of all kinds, &c.—turned out there annually—of the article of stocks, above $100,000 worth. The suspender factory employs 200 persons, who manufacture $150,000 worth per annum. Connecticut may safely challenge the universal Yankee nation to compete with her in the manufacture of small things—from wooden nutmegs to wooden clocks upwards. We would give a sixpence for a statistical table exhibiting the items and amount total of her productions in this line—doubting not that it would astonish even the natives.—[Greenfield Gazette.]

The plates mentioned in the following article must be of exceeding beauty. We are glad to see that the ladies, with their customary good taste, have sanctioned the use of the article:—

NEW AND ELEGANT ARTICLE OF GLASSWARE.—The Boston Gazette says—"The New England Glass Company are now manufacturing plain fire-polished dishes, a rich and beautiful article, resembling at night polished silver—adapted for fruit, blanc mange, &c.; and, what is more, receiving the approbation of the ladies."

M. Marchal displayed his new vehicle on the Boulevards at Brussels on the 23d inst. This vehicle invented by himself, carries with it its own Railroad, and can travel upon all sorts of roads. The experiments made with it have answered most completely and the vehicle, with 22 persons in it, after having gone along the Boulevards, passed before the King's Palace.



METHOD OF EMPLOYING THE ESCAPE STEAM OF A STEAM-ENGINE FOR DISTILLING AND OTHER PURPOSES. INVENTED AND PATENTED BY CAPTAIN DAVIS EMBREEE, OF NEW RICHMOND, OHIO.

The cut is intended to represent the heater (or, as it is sometimes called, condenser,) of a steam-engine. This is laid down 45 inches in diameter, and 30 inches high. It matters not what shape it has, but its contents ought to be greater than the contents of the cylinder; three or four times as large would be no disadvantage: part of an old steamboat boiler would make a good one. At the top is an opening of 5 inches diamter—over this there is a cast-iron pipe 8 inches diameter in the clear, and 12 inches high: a valve seat at the bottom with 4¾ inches opening, and a guide for the stem of the valve of the same casting. At the top of the pipe there is a common cap with a hole and stuffing-box as a guide for the upper end of the valve-stem; an arm and elbow is cast to this pipe, 5 inches in diameter, to which a copper pipe of the same diameter may be attached to carry off the waste steam. The valve ought to weigh about forty pounds, and be cast with a hollow at the top to receive lead to regulate the weight. The size of the valve might be 5½ inches in diameter, and 6 or 6½ high. If it be made to weigh 45 pounds on a 4¾ inch opening, it will be about 2½ pounds to the inch. The stem of the valve should be wrought-iron; a screw should be cut on the top of the stem; there should be a small bail or handle to screw on it, so as to hook it up, and allow the steam a free passage when not in use. The lower pipe to the right hand, with a cock, is the supply-pipe from the heater to the force-pump 2½ inches diameter, placed within 4 inches of the bottom of the heater; the next above it is the scape-pipe from the cylinder to the heater, 5 inches in diameter. The next (or bent) pipe carries the steam from the heater to the stills; this should be 2½ inches in diameter, with a large cock affording the same vent. This pipe and cock will not answer with less vent than 2 inches in diameter. The next is an open wooden spout, from the top of the flake-stand to a pipe that descends into the heater; through this, there must be kept a constant stream of water to supply the engine. The pipe into the heater should be of copper, 2 inches in diameter; 87 inches long, descending within two inches of the bottom of the heater, with a cock in it to regulate the supply. At the top of this pipe there should be a kind of funnel 6 or 8 inches in diameter, in which a strainer ought to be placed; this funnel can have a lip that will let off any surplus water into a wooden spout, to be carried off. The bent-pipe to the left hand is the waste-pipe, to carry off any surplus water that may be let into the heater. This must descend (into the ground, if necessary) 87 inches, and rise again to the same level. It ought to be 2 inches in diameter, and be placed 7 inches from the bottom of the heater.

The principles upon which the machinery herein described operates, are as follow:

Water, and many other fluids, weigh 8 lbs. per gallon; the gallon contains 231 cubic inches; therefore a vessel containing water, or other fluids of equal weight, to the depth of 58 inches, will be about 2 lbs. to the inch. Hence, a valve placed on the heater of an engine, which weighs 2½ lbs. to the inch, will force steam from the body of the heater, through a pipe or tube to the bottom of such vessel and boil it. The quantity wanted can be regulated by a stop-cock, and the remainder will pass off through the valve.

In order to pass water into the heater of an engine under this press of steam, there must be a head raised of greater weight than the valve, say 87 inches high, which will be about 3 lbs. to the inch.

If a surplus of water be let into the heater, it can be carried off by a waste-pipe, which should descend 87 inches, and then rise to the same level; by this means a column of water will be preserved in the pipe, which will prevent the steam from escaping, and, at the same time, let off any surplus water. The shape and size of machinery can be varied at pleasure, taking care to preserve the principles mentioned.

By this operation, there will be a *back lash* or counter pressure on the head of the piston, of say, 2½ lbs. to the inch. Several months experience, however, at the Richmond steam-mill, has proved, that this is more than over-balanced by the *additional* heat the water acquires in the heater, in consequence of the pressure of the steam. The water is thrown into the boilers of the engine in a *boiling* state. It therefore takes less fuel to drive a mill with stills, in this way, than it does to drive the mill without the stills in the usual way. The *power* required is trifling; it is the great body of *heat* contained in the scape-steam, that is brought into use by this invention.

In distilling with this weight of valve, care ought to be taken to have the depth of the beer in stills, and the depth of singlings in the doubler, added together, less than 58 inches. Some inches are frequently added to the depth by the condensatoin of steam, particularly in boiling cold charges at the commencement of the work. The quantity of beer made use of as a charge, ought to be kept as nearly the same, at every charge, as possible. A tube should be fixed in the vessel used as a heater, at the proper height to hold a charge, with a spout from it into the cistern where the beer pump stands, to carry back what may be pumped over the requisite quantity. It is also necessary to double at every charge, so as to keep the same *weight* in the stills at all times, or the running will not be regular.

In using the scape-steam, there is a complete system of balancing; the columns of water in the pipes at the heater are slightly kept in motion, swelling and sinking as they outweigh the valve; the valve may be said to float in steam, gently touching its seat, then rising at every new impulse; while the still pours out a stream of condensed liquor with a *regularity* that can scarcely be surpassed by any thing in nature.

The following report will be found interesting to many of our readers—and therefore we give it entire, with the proposed new organization of the department:—

THE SELECT COMMITTEE APPOINTED TO TAKE INTO CONSIDERATION THE STATE AND CONDITION OF THE PATENT OFFICE, AND THE LAWS RELATING TO THE ISSUING OF PATENTS FOR NEW AND USEFUL INVENTIONS AND DISCOVERIES, SUBMIT THE FOLLOWING REPORT:

The promotion of the arts and the improvement of manufactures, are the objects aimed at in granting patents for inventions. All civilized nations have provided in some form for the encouragement of inventive genius. England, from whom we derived, originally, most of our notions of national polity, and who has hitherto been considered the "queen of arts," is in no small degree indebted for the distinction, to the liberality with which she has always rewarded genius and science for their inventions and discoveries. Individual munificence and the patronage of wealthy associations, have there, as in France and Germany, done much to supply whatever was wanting in the liberality of the Government. But such patronage is necessarily partial in its operation. It is limited to particular objects, if not to particular individuals. There appears to be no better way of measuring out appropriate rewards for useful inventions, than, by a general law, to secure to all descriptions of persons, without discrimination, the exclusive use and sale, for a given period, of the thing invented. In this way they will generally derive a just and appropriate encouragement proportioned to the value of their respective inventions. It is not at this day to be doubted that the evil of the temporary monopoly is greatly overbalanced by the good the community ultimately derives from its toleration.

The granting of exclusive privileges was in England originally assumed as a prerogative of the Crown, from which it derived a revenue. It was at first limited to the introduction of manufactures from other countries. Afterwards like privileges were granted for new inventions made within the realm. Like all other regal prerogatives, it was subject to abuse, and Parliament found it necessary to limit and restrain it. This was done by the famous statute of monopolies, passed in the reign of James I, which defined the King's prerogative in respect to the description of grants which might legally be made, and among them were patents for inventions and new manufactures. The very brief reservation of right in the Crown contained in that statute, and the judicial decisions in cases arising under the grants of privileges made pursuant to it, constituted the whole of the English law on the subject up to 1835, when a law was passed by Parliament giving the right to file a disclaimer in certain cases, and containing some other less material provisions.

It is from those judicial decisions that we have derived most of the principles on which our laws on the subject are founded, and which have entered into and influenced the judicial expositions given to them. But the decsions of our courts have been characterized by a more enlightened and liberal application of equitable principles to cases of this description, in a just endeavor to sustain patents for meritorious inventions, instead of seeking to find, in the technicalities of law, a pretext for setting them aside.

Prior to the adoption of the Federal constitution, the States, within their narrow limits, could give very little encouragement to inventors by grants of exclusive privileges; and up to that time the arts had made very little progress on this side of the Atlantic. By the constitution of the United States that power was wisely vested in Congress.

The first act of Congress on the subject was passed in 1790. It authorized the Secretary of State, Secretary of War and the Attorney General, or any two of them, on application, to grant patents for such new inventions and discoveries as they should deem "*sufficiently useful and important.*" Under that act the board so constituted exercised the power of refusing patents for want of novelty in the invention or of sufficient utility and importance.—This act extended the same privilege to aliens as to citizens. In 1793, it was repealed, and another act passed, authorizing patents to citizens of the United States only, to be granted by the Secretary of State, subject to the revision of the Attorney General. In 1800, the privilege to take out patents was extended to aliens who have resided two years in this country, and made oath of their intention of becoming citizens of the United States.

The act of 1793, which is still in force, gives, according to the practical construction it has received, no power to the Secretary to refuse a patent for want of either novelty or usefulness. The only inquiry is whether the terms and forms prescribed are complied with. The granting of patents, therefore, is but a ministerial duty. Every one who makes application is entitled to receive a patent by paying the duty required, and making his application and specification in conformity with the law. The necessary consequence is, that patents have, under the act of 1793, been daily granted, without regard to the question of novelty, or even utility in the ordinary sense; for it has been settled that the term useful, as used in this statute, is only in contradistinction to hurtful, injurious, or pernicious. This construction (that no right is conferred to refuse a patent) has been given to the law by the Department charged with the duty of granting patents, not so much probably from any necessary and unavoidable import of the terms of it, as from a disinclination to exercise a power of so much importance, in cases where it is not clearly and distinctly granted. And it may be reasonably doubted whether it was the intention of Congress to confer such a power on the Secretary of State alone, since no provision is made for an appeal or other remedy for an incorrect decision adverse to the applicant. Besides, any person occupying that station might be supposed as little qualified by an acquaintance with the appropriate branches of science or of the arts, to decide such questions, as any other officer of the Government. And were he to undertake the task of such an examination as would be necessary to a decision in each case, he would have little time for other official duties.

Under the act referred to, the Department of State has been going on for more than forty years, issuing patents on every application, without any examination into the merit or novelty of the invention. And the evils which necessarily result from the law as it now exists, must continue to increase and multiply daily, till Congress shall put a stop to them. Some of them are as follows:

1. A considerable portion of all the patents granted are worthless and void, as conflicting with, and infringing upon one

another, or upon public rights not subject to patent privileges; arising either from a want of due attention to the specifications of claim, or from the ignorance of the patentees of the state of the arts and manufactures, and of the inventions made in other countries, or even in our own.

2. The country becomes flooded with patent monopolies, embarrassing to bona fide patentees, whose rights are thus invaded on all sides; and not less embarrassing to the community generally, in the use of even the most common machinery and long-known improvements in the arts and common manufactures of the country.

3. Out of this interference and collision of patents and privileges, a great number of lawsuits arise, which are daily increasing in an alarming degree, onerous to the courts, ruinous to the parties, and injurious to society.

4. It opens the door to frauds, which have already become extensive and serious. It is represented to the committee that it is not uncommon for persons to copy patented machines in the model-room; and, having made some slight immaterial alterations, they apply in the next room for patents. There being no power given to refuse them, patents are issued of course. Thus prepared, they go forth on a retailing expedition, selling out their patent rights for States, counties, and townships, to those who have no means at hand of detecting the imposition, and who find, when it is too late, that they have purchased what the vendors had no right to sell, and which they obtain thereby no right to use. This speculation in patent rights has become a regular business, and several hundred thousand dollars, it is estimated, are paid annually for void patents, many of which are thus fraudulently obtained.

In this collision and interference of patents, the original and meritorious inventor sees his invention, to the perfection of which he has devoted much time and expense, pirated from him, and he must forego the reward which the law was intended to secure to him in the exclusive right it grants; or he must become involved in numerous and expensive lawsuits in distant and various sections of the country, to protect and confirm his rights. If he be wise, he will generally avoid the latter, and submit to the former alternative of injustice, to which the Government, as the law now is, makes itself accessary. The practice is scarcely less reprehensible, of taking out patents for what has been long in public use, and what every one has therefore a right to use. The patentee in such cases being armed with the apparent authority of the Government, having the sanction of its highest officers the seal of state, scours the country, and by threats of prosecution, compels those who are found using the thing patented, to pay the patent price or commutation tribute. This exaction, unjust and iniquitous as it is, is usually submitted to.

The extent of the evils resulting from the unrestrained and promiscuous grants of privileges, may be imagined, when it is considered that there are now issued, since this year commenced, at the rate of more than a thousand a year; a considerable portion of which are doubtless void for want of originality in the inventions patented, either in whole or in some of the parts claimed as new.

A necessary consequence is, that patents even for new and meritorious inventions are so much depreciated in general estimation, that they are of but little value to the patentees, and the object of the patent laws, that of promoting the arts by encouragement, is in a great measure defeated.

To prevent these evils in future is the first and most desirable object of a revision and alteration of the existing laws on this subject. The most obvious, if not the only means of affecting it, appears to be to establish a check upon the granting of patents, allowing them to issue only for such inventions as are in fact new and entitled, by the merit of originality and utility, to be protected by law. The difficulty encountered in effecting this, is in determining what that check shall be; in whom the power to judge of inventions before granting a patent can safely be reposed, and how its exercise can be regulated and guarded, to prevent injustice through mistake of judgment or otherwise, by which honest and meritorious inventors might suffer wrong.

It is obvious that the power must, in the first instance, be exercised by the department charged with this branch of the public service. But as it may not be thought proper to intrust its final exercise to the department, it is deemed advisable to provide for an occasional tribunal to which an appeal may be taken. And as a further security against any possible injustice, it is thought proper to give the applicant in certain cases, where there may be an adverse party to contest his right, an opportunity to have the decision revised in a court of law.

The duty of examination and investigation necessary to a first decision at the Patent Office is an important one, and will call for the exercise and application of much scientific acquirement and knowleege of the existing state of the arts in all their branches, not only in our own, but in other countries. Such qualifications in the officers charged with the duty, will be the more necessary and desirable, because the information upon which a rejection is made at the office, will be available in the final decision. It becomes necessary, then, to give the Patent Office a new organization, and to secure to it a character altogether above a mere clerkship. The competency and efficiency of its officers should correspond with their responsibility, and with the nature and importance of the duties required of them. When the existing organization was adopted, the granting of patents was a matter of little importance, compared with with what it now is. The arts in this country were but little understood, and but little cultivated. Agriculture and commerce constituted our principal business. We had few manufactures, except those of a domestic character, adapted to ordinary domestic wants. Our work-shops were in Europe. Enterprise, in this country, ran in other channels. The war of 1812 gave it a new direction, and a new impulse, by creating an occasion for work-shops of our own. Necessity became the mother of invention, and American manufactures sprang into existence as by enchantment. Their rise and progress may be dated from that period; and a more rapid advancement in the arts, and a more astonishing development of human ingenuity, have never taken place in any other age or country. This remark will appear far from extravagant to every one who will take the trouble to examine the subject. This awakening of dormant genius to a practical and active existence, next to the arousing of the political and patriotic energies of the Union, was one of the great results of that contest.—It opened to the country a new era. The nation entered upon a new existence. And since that period, American industry and enteprise, guided by American ingenuity and intellect, have achieved what would have taken Europe a century to accomplish. She has become all at once a manufacturing, as well as an agricultural and commercial nation. The useful arts have been cultivated with a success before unexampled, and have contribnted, in no small degree, to the wonderful improvements which have spread themselves over our whole country. Who can predict the results, even in a few years, of that spirit of enterprise which pervades the Union, when, aided by the Genius of Invention, and propelled onward by powers which she alone can bring into exercise? The very elements are submissive to her will, and all the endless combinations of mechanism are subservient to her purposes. She participates in almost every business and employment of man. Agriculture itself might as well dispense with fertility of soil, as with her aid in its cultivation.

The greatly increasing number of patents granted, affords some indication of the improvements which have been going on in the useful arts from year to year. The average number issued annually, from 1790 to 1800, was but 26; from 1800 to 1810, the average number was 91; from 1810 to 1820, it was 200; and, for the last ten years, the average number has been 535. During the last year, there were issued 776; and there have been granted in the first quarter of the present year 274, being more in three months than were issued in the whole of the first period of ten years. In the 22 years preceding the war of 1812, the average annual number was 73. The first quarter of the present year indicates an aggregate for the year, of 1,096; the amount of the duties on which, will be upwards of $32,000. The whole number issued at the Patent Office, under the laws of the United States, up to the 31st of March last, is 9,731. This is more than double the number which have been issued either in England or France, during the same period. In England for ten years preceding 1830, the average number of patents granted in one year was 145.

Whoever imagines that, because so many inventions and so many improvements in machinery have been made, there remains little else to be discovered, has but a feeble conception of the infinitude and vastness of mechanical powers, or of the unlimited reach of science.—Much as has been discovered, infinitely more remains unrevealed. The ingenuity of man is exploring a region without limits, and delving in a mine whose treasures are exhaustless. "Neither are all the mysteries of nature unfolded, nor the mind tired in the pursuit of them."

The first conceptions of ingenuity, like the first suggestions of science, are theories which require something of experiment and practical exemplification to perfect. Mechanical inventions are at first necessarily crude and incomplete.—Time is required to develope their imperfections and to make the improvements necessary to their adaption to practical uses. Inventors generally obtain patents before they venture upon those experiments which only can test their inventions. They are apprehensive of being forestalled in their discoveries, and see no other means of protecting themselves against piracy and fraud, than by securing patents at once.

A remedy for this may be easily had in a provision authorizing caveats to be filed in the office, giving security to the right of discovery for a time sufficient for making the necessary experiments, inquiries and improvements.

Heretofore aliens not resident in this country, have not been admitted to the privileges of our patent laws. But, as American citizens are allowed to take out patents in England and in other countries, a principle of reciprocity would seem to require that foreigners should have similar privileges here, on paying a similar duty or amount of fees that is exacted of our citizens abroad. The fees payable in England, on taking out a patent, amount to $585. If a patent be taken out for the three kingdoms of England, Ireland, and Scotland, they amount to $1,680.—In France they are $309; in Spain $292; Austria, $208.

A power in the Commissioner of the Patent Office to reject applications for want of novelty in the invention, it is believed, will have a most beneficial and salutary effect in relieving meritorious inventors, and the community generally, from the serious evils growing out of the granting of patents for every thing indiscriminately, creating interfering claims, encouraging fraudulent speculators in patent rights, deluging the country with worthless monopolies, and laying the foundation for endless litigation.

In nineteen cases out of twenty, probably, the opinion of the Commissioner, accompanied by the information on which his decision is founded, will be acquiesced in. When unsatisfactory, the rights of the applicant will find ample protection in an appeal to a board of examiners, selected for their particular knowledge of the subject-matter of the invention in each case.

By this means, without danger to actual and honest inventors, the number of patents would be somewhat diminished. But there would be more confidence in those which should be granted, and as those which have been heretofore issued, should be daily expiring by their limitation, the community would begin to feel and realize the advantages of such a change. The present law waits till infringements and frauds are consummated—nay, it even aids them; and then it offers an inadequate remedy for the injury, by giving an action for damages. It ought, rather, by refusing to grant interfering patents, to render prosecutions unnecessary. Instead of sanctioning the wrong by granting the privilege to commit it, it should arrest injury and injustice at the threshold, and put an end to litigation before it begins.

Important and interesting as the Patent Office is now considered, it is believed that, under such new organization as is contemplated by the bill presented herewith, it will contribute largely to the great interests of the country, and bear no small part in elevating our national character. American ingenuity has obtained much consideration on the other side of the Atlantic. Even the manufactures of England are not a little indebted to it for some of their most valuable improvements. Her woollen manufactures, especially, have, within a few years, undergone an entire change, by the adoption of American inventions, by which wool has been made as yielding and submissive to the power of machinery as any material whatever. Cotton machinery has also been greatly improved in the hands of our mechanics; and while England receives from us three-fourths of the cotton she uses in raw material, we furnish her also with some of the most valuable improvements in the means of manufacturing it. Indeed, what mechanism or manufacture has, for the last twenty years, been brought across the Atlantic, that has not, on being returned, borne the distinguished marks of the superior ingenuity of American mechanists? Formerly, we borrowed and copied much that was valuable from Europe. Now, Europe is borrowing and copying, with no little advantage, from us; and she must not be too much surprised if she shall soon find a formidable balance against her.

To carry fully into effect the objects which have been had in view, it will be necessary to provide larger and more commodious rooms for models, &c., than those now occupied for that purpose.—They are insufficient for the models of machinery and other inventions now deposited there, and the number will be increasing several hundred, perhaps a thousand, every year. A great number, supposed to be about five hundred, from a want of room for them elsewhere, have been stowed away in a dark garret.—Those which occupy the rooms designed for them, are crowded together in a manner unfavorable for exhibition or examination. In such a situation, it is impossible to give them any systematic or scientific arrangement. This disorder and confusion must necessarily be increased by the addition of those hereafter furnished, or they must be consigned to the garret, the common receptacle, where, instead of promoting a taste for, and facilitating the study of, the useful arts, they will only afford evidence of the improvidence of the Government. In addition to this, the present building is too much exposed to destruction by fire. The loss of records and drawings and of the several thousands of interesting and valuable models now preserved there, would be, in a great degree, irreparable. There is no additional room to be had in the building they now occupy. The Post Office Department, in the same building, instead of having any room to spare which is now appropriated to it, requires a considerable extension of accommodations, from its increased and increasing business. It needs the whole building. The only way, therefore, of providing the necessary extension of room for the accommodation of the Post Office Department, and the city post office, and of providing the requisite accommodation for the Patent Office, is to erect a suitable fire-proof building for the latter on some one of the public lots. There are ample funds arising from duties on patents, heretofore paid into the Treasury, to the account of clerk hire in that office, which remain unexpended. A portion of that surplus fund, being now about $152,000, may well be appropriated to the construction of a building which should be commodious and comparatively safe from fire.

Such a building as this branch of the public interests requires, would do honor to the Government and the country. The Patent Office, with such accommodations, containing the records of this age of inventions, displaying in its halls and galleries numberless models of igenious and useful mechanism, and contrivances in almost infinite variety, adapted to the mechanic arts, to manufactures, to husbandry, to navigation, steam power, horse power, water power, Railroad transportation, and, in fine, to all the common trades and mechanical pursuits of life, as well as to our rapidly multiplying and magnificent public works, would present an object of interest, and tend not a little to elevate our national character. It has been justly remarked that we can go into no mechanic shop, into no manufactory of any description, upon no farm or plantation, or travel a mile on our Railroads or in our steamboats, without seeing the evidence of our originality, and witnessing the fruits and effects of our ingenuity and enterprise. All the inventions and improvements in mechanism which have done so much towards advancing the useful arts and manufactures, should, as far as practicable, be exhibited in one view in the halls of the Patent Office.—Such a display would attract the attention of the many thousands who annually visit the capital of the Union from all quarters

of the country, and all parts of the world. No other nation has yet any thing to be compared with it; neither England nor France has ever required models to be deposited of patented machinery. Collection of models and drawings have sometimes been made by private associations, but they are small in number compared with those we possess.

In addition to the models of machinery, it is proposed to embrace an exhibition of specimens of useful and elegant fabrics and of works of art, which manufacturers and artificers may place there for that purpose. It might, too, embrace a cabinet of interesting minerals, which may be received from time to time from the various parts of our widely-extended country, with polished specimens of its beautiful marbles from their different locations, illustrating the geology and many of the natural resources of the country; and, also, a collection of Indian curiosities and antiquities, many of which are now in the possession of one of the Departments, boxed up for want of some suitable place for their exhibition.

In short, the halls of the Patent Office should present a national museum of the arts, and be a general repository of all the inventions and improvements in machinery and manufactures, of which our country can claim the honor; together with such other objects of interest as might conveniently and properly be placed under the superintendence of the Commissioner. Such an institution, while it would be an object of just pride to every American, would have scarcely less influence in advancing and accelerating the progress of the useful arts and the improvement of our manufactures, than would even the encouragement afforded by granting patents for inventions or establishing high tariffs of protection.

With these views, the committee cannot hesitate to recommend an entire reorganization of the Patent Office, and several material alterations in our law of patents, suiting it to the present condition of the arts and the altered circumstances of the country.

A bill in conformity with our views is herewith submitted.

A BILL TO PROMOTE THE PROGRESS OF THE USEFUL ARTS, AND TO REPEAL ALL ACTS AND PARTS OF ACTS HERETOFORE MADE FOR THAT PURPOSE.

Be *it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled*, That there shall be established, and attached to the department of State, an office to be denominated the Patent Office; the chief officer of which shall be called the Commissioner of Patents, to be appointed by the President, by and with the advice and consent of the Senate, whose duty it shall be under the direction of the head of the department, to superintend, execute, and perform, all such acts and things touching and respecting the granting and issuing of patents for new and useful discoveries, inventions, and improvements as are herein provided for, or shall hereafter be, by law, directed to be done and performed, and shall have the charge and custody of all the books, records, papers, models, machines, and all other things belonging to said office. And said Commissioner shall receive the same compensation as is allowed by law to the Commissioner of the Indian Department.

Sec. 2. *And be it further enacted*, That there shall be, in said office, an inferior officer, to be appointed by the said principal officer, with the approval of the Secretary of State, and to be called the Chief Clerk of the Patent Office; who, in all cases during the necessary absence of the Commissioner, or when the said principal office shall become vacant, shall have the charge and custody of the seal, and of the records, books, papers, machines, models, and all other things belonging to the said office. And the said Commissioner may also, with like approval, appoint two other clerks, an examiner of patents, a draughtsman, a mechanist, and a messenger. The said chief clerk shall receive the annual salary of seventeen hundred dollars; two other clerks, twelve hundred and fifty dollars each; examiner, fifteen hundred dollars; draughtsman, twelve mechanist, one thousand dollars; and the messenger five hundred dollars.

Sec. 3. *And be it farther enacted*, That the said principal officer, and every other person to be appointed in the said office, shall, before he enters upon the duties of his office, or appointment, make oath or affirmation truly and faithfully to execute the trust committed to him. And the said Commisioner, and the chief clerk shall also, before entering upon their duties, severally give bonds with sureties, to the Treasurer of the United States, each in the sum of ——— dollars, with condition to render a true and faithful account to him, or his successor in office, quarterly, of all moneys which shall be by them respectively received for duties on patents, and for copies of records and drawings, and all other moneys received by virtue of such office.

Sec. 4. *And be it further enacted*, That the said Commissioner shall cause a seal of office to be made and provided for the said office, with such device as the President of the United States shall approve; and copies of any records, books, papers, or drawings, belonging to said office, under the signature of the said Commissioner, or when the office shall be vacant, under the signature of the chief clerk, with the said seal affixed, shall be competent evidence in all cases in which the original records, books, papers, or drawings, would be evidence. And any person making application therefor, may have certified copies of the records, drawings, and other papers deposited in said office, on paying, for the written copies, the sum of ten cents for every page of one hundred words; and for copies of drawings, the reasonable expense of making the same.

Sec. 5. *And be it further enacted*, That all patents issuing from said office, shall be issued in the name of the United States, and under the seal of said office, and be signed by the Secretary of State, and countersigned by the Commissioner of said office, and shall be recorded, together with the descriptions, specification, and drawings, in the said office, in books to be kept for that purpose. Every such patent shall contain a short description of the invention or discovery, and in its terms grant to the applicant or applicants, his or their heirs, administrators, executors, or assigns, for a term not exceeding fourteen years, the full and exclusive right and liberty of using, and vending to others to be used, the said invention or dicsovery, referring to the specifications for particulars thereof, a copy of which shall be annexed to the patent, specifying what the patentee claims as his invention or discovery.

Sec. 6. *And be it further enacted*, That any person or persons having discovered or invented any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement on any art, machine, manufacture, or composition of matter, not known or used by others before his or their discovery or invention thereof, and not, at the time of his application for a patent, in public use or on sale, with his consent or allowance as the inventor or discoverer; and shall desire to obtain an exclusive property therein, may make application in writing to the Commissioner of Patents, expressing such desire, and the Commissioner, on due proceedings had, may grant a patent therefor. But before any inventor shall receive a patent for any such new invention or discovery, he shall deliver a writen description of his invention or discovery, and of the manner and process of making, constructing, using, and compounding the same, in such full, clear, and exact terms, avoiding unnecessary prolixity, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same; and in case of any machine, he shall fully explain the priciple, and the several modes in which he has contemplated the application of that principle, or character by which it may be distinguished from other inventions; and shall particularly specify and point out the part, improvement, or combination, which he claims as his own invention or discovery. He shall, furthermore, accompany the whole with a drawing, or drawings, and written references, where the nature of the case admits of drawings, or with specimens of ingredients, and of the composition of matter, sufficient in quantity for the purpose of experiment, where the invention or discovery is of a composition of matter; which descriptions and drawings, signed by the inventor, and tested by 2 witnesses shall be filed in the patent office; and he shall, moreover, furnish a model of his machine, in all cases which admit of a representation by model, of a convenient size to exhibit advantageously its several parts. The applicant shall also make oath or affirmation that he does verily believe that he is the original inventor or discoverer of the art, machine, composition, or improvement, for which he solicits a patent, and that he does not know or believe that the same was ever before known or used; which oath or affirmation may be made before any person authorized by law to administer oaths.

Sec. 7. *And be it further enacted*, That,

on the filing of any such application, description, and specification, and the payment of the duty hereinafter provided, the Commissioner shall make, or cause to be made, an examination of the alleged new invention or discovery; and if, on any such examination, it shall not appear to the Commissioner that the same had been known and used prior to such alledged discovery thereof by the applicant, or had been in public use, or on sale, with his consent or allowance prior to the application, if he shall deem it to be sufficiently useful and important, it shall be his duty to issue a patent therefor. But whenever, on such examation, it shall appear to the Commissioner that the applicant was not the original inventor or discoverer thereof,or that any part of that which is cclaimed as new had before been known and used as aforesaid, or that the description is defective and insufficient, he shall notify the applicant thereof, giving him, briefly, such information as may be useful in judging of the propriety of renewing his application, or of altering his specification to embrace only that part of the invention or discovery which is new. In every such case, if the applicant shall elect to withdraw his application, he shall be entitled to receive back—— dollars, part of the duty required by this act, on filing a notice in writing of such election in the Patent Office, a copy of which, certified by the Commissoner, shall be a sufficient warrant to the Treasurer for paying back to the applicant the said sum of ——— dollars. But if the applicant in such case shall persist in his claim for a patent, with or without any alteration of his specification, he shall be required to make oath or affirmation anew, in manner as aforesaid. And if the specification and claim shall not have been so modified as, in the opinion of the Commissioner, shall entitle the applicant to a patent, he may, on appeal, and upon request in writing, have the decision of a board of examiners, to be composed of three disinterested persons, who shall be appointed for that purpose by the Secretary of State, and to be selected for their knowledge and skill in the particular art, manufacture, or branch of science to which the alleged invention appertains; who shall be furnished with a certificate in wri ing, of the opinion and decision of the Commissioner, stating the particular grounds of his objection, and the part or parts of the invention which he considers as not entitled to be patented. And the said board shall give reasonable notice to the applicant, as well as to the Commissioner, of the time and place of their meeting, they may have an opportunity of furnishing them with such facts and evidence as they may deem necessary to a just decision; and it shall be the duty of the Commissioner to furnish the board of examiners with such information as he may possess relative to the matter under their consideration. And on an examination and consideration of the matter by such board, it shall be in their power, or of a majority of them, to reverse the decision of the Commissioner, either in whole or in part; and their opinion being certified to the Commissioner, he shall be governed thereby, in the further proceedings to be had on such application; *Provided, however,* That before a board shall be instituted in any such case, the applicant shall pay to the Commissioner the sum of ——— dollars, which shall be in full compensation to the persons who may be so appointed, for their examination and certificate as aforesaid.

Sec. 8. *And be it further enacted,* That whenever an application shall be made for a patent, which, in the opinion of the Commissioner, would interfere with any other patent for which an application may be pending, or with any unexpired patent which shall have been granted, it shall be the duty of the Commissioner to give notice thereof to such applicants, or patentees, as the case may be; and if either shall be dissatisfied with the decision of the Commissioner on the question of priority or right of invention, he may appeal from such decision, on the like terms and conditions as are provided in the preceding section of this act: and the like proceedings shall be had to determine which, or whether either of the applicants is entitled to receive a patent as prayed for.

Sec. 9. *And be it further enacted,* That before any application for a patent shall be considered by the Commissioner as aforesaid, the applicant shall pay into the Treasury of the United States, or into the Patent Office, or into any of the deposite banks, to the credit of the Treasury, if he be a citizen of the United States, or an alien and shall have been resident in the United States for one year next preceding, and shall have made oath of his intention to become a citizen thereof, the sum of forty dollars; if a subject of the King of Great Britain, the sum of five hundred dollars; and all other persons the sum of three hundred dollars; for which payment duplicate receipts shall be taken, one of which to be filed in the office of the Treasurer. And the moneys received into the Treasury under this act shall constitute a fund for the payment of the salaries of the officers and clerks, herein provided for, and all other expenses of the Patent Office, and to be called the patent fund.

Sec. 10. *And be it further enacted,* That where any person hath made, or shall have made, any new invention, discovery, or improvement, on account of which a patent might by virtue of this act be granted, and such person shall die before any patent shall be granted therefor, the right of applying for and obtaining such patent shall devolve on the executor or administrator of such person, in trust for the heirs at law of the deceased, in case he shall have died intestate; but if otherwise, then in trust for his devisees, in as full and ample manner, and under the same conditions, limitations, and restrictions, as the same was held, or might have been claimed or enjoyed by such person in his or her lifetime; and when application for a patent shall be made by such legal representatives, the oath or affirmation provided in the third section of the beforementioned act, shall be so varied as to be applicable to them.

Sec. 11. *And be it further enacted,* That every patent issued in pursuance of this act shall be assignable in law, either as to the whole interest, or any undivided part thereof, by any instrument in writing; which assignment shall be recorded in the Patent Office within three months from the execution thereof, for which the assignee shall pay the Commissioner the sum of ——— dollars.

Sec. 12. *And be it further enacted,* That any citizen of the United States, or alien, who shall have been resident in the United States one year next preceding, and shall have made oath of his intention to become a caveat setting forth the design and purpose thereof, and its principal and distinguishing characteristics, and praying protection of his right, till he shall have matured his invention; which caveat shall be filed in the confidential archives of the office, and preserved in secrecy. And if application shall be made by any other person within one year from the time of filing of such caveat, for a patent of any invention with which it may in any respect interfere,ti shall be the duty of the Commissioner to give notice to the person filing the caveat, of such application and of such supposed interference, who shall, within two months after receiving the notice, if he would avail himself of the benefit of his caveat, file his description, spifications, drawings, and model; and if, in the opinion of the Commissioner, the specifications of claim interfere with each other, like proceedings may be had in all respects, as are in this act provided in the case of interfering applications: *Provided, however,* That no opinion or decision of any board of examiners, under the provisions of this act, shall preclude any person interested in favor of or against the validity of any patent which has been or may hereafter be granted, from a citizen thereof, who shall have invented any new art, machine, or improvement thereof, and shall desire further time to mature the same, may file in the Patent Office the right to contest the same in any judicial court, having jurisdiction of the subject-matter.

Sec. 13. *And be it further enacted,* That whenever any patent which has heretofore been granted, or which shall hereafter be granted, shall be inoperative or invalid, by reason of a defective or insufficient description or specification, or by reason of the patententee claiming in his specification as his own invention, more than he had or shall have a right to claim as new; if the error has, or shall have arisen by inadvertency, accident or mistake, and without any fraudulent or deceptive intention, it shall be lawful for the Commissioner, upon the surrender to him of such patent, and the payment of a further duty of fifteen dollars, to cause a new patent to be issued to the said inventor, for the same invention, for the residue of the period then unexpired for which the original patent was granted, in accordance with the patentee's corrected description and speeification. And in case of his death, or any assignment made by him of the original patent, a similar right shall vest in his executors, administrators, or assignees. And the patent, so re-issued, together with the corrected description and specification, shall have the same effect and operation in law, on the trial of all actions

relative to the violation of such invention, as though the same had been originally filed in such corrected form, before the serving out of the original patent. And whenever the original patentee shall be desirous of adding the description and specification of any new improvement of the original invention or discovery which shall have been invented or discovered by him subsequent to the date of his patent, he may, like proceedings being had in all respects, as in the case of original applications, and on the payment of fifteen dollars, as hereinbefore provided, have the same annexed to the original description and specification; and the Commissioner shall certify, on the margin of such annexed description and specification, the time of its being annexed and recorded; and the same shall thereafter stand on the same footing to all intents and purposes as though it had been embraced in the original description and specification.

Sec. 14. *And be it further enacted*, That whenever in any action for damages for using or selling the thing whereof the exclusive right is secured by any patent heretofore granted, or by any patent which may hereafter be granted, a verdict shall be rendered for the plaintiff in such action, it shall be in the power of the court to render judgment for any sum above the amount found by such verdict as the actual damages sustained by the plaintiff, not exceeding three times the amount thereof, according to the circumstances of the case; and such damages may be recovered by action on the case, in any court of competent jurisdiction.

Sec. 15. *And be it further enacted*, That the defendant in any such action shall be permitted to plead the general issue, and to give this act and any special matter in evidence of which notice in writing may have been given to the plaintiff or his attorney, thirty days before trial, tending to prove that the description and specification filed by the plaintiff does not contain the whole truth relative to his invention, or discovery, or that it contains more than is necessary to produce the described effect; which conceal ment or addition shall fully appear to have been made for the purpose of deceiving the public; or that the thing patented was not originally discovered by the patentee, or had been in use, or had been described in some public work anterior to the supposed discovery thereof by the patentee, or had been in public use or sold with the consent and allowance of the patentee before his application for a patent; or that he had surrepticiously or unjustly obtained a patent for that which was in fact invented or discovered by another; or that the patentee if an alien at the time the patent was granted, had failed and neglected, for the space of eighteen months from the date of the patent, to put in operation and use in the United States, and put on sale to the citizens thereof, on reasonable terms, the invention or discovery for which the patent issued; or in case the same, for any period of eighteen months after it shall have been put in operation and use, shall cease to be so used or put on sale; in either of which cases judgment shall be rendered for the defendant with costs; *Provided, however*, That whenever the plaintiff shall fail to sustain his action on the ground that, in his specification of claim is embraced more than that of which he was the first inventor, if it shall appear that the defendant had used or violated any part of the invention justly and truly specified and claimed as new; it shall be in the power of the court to adjudge and award as to costs as may appear to be just and equitable.

Sec. 16. *And be it further enacted*, That whenever there shall be two interfering patents, or whenever a patent on application shall have been refused on an adverse decision of a board of examiners on the ground that the patent applied for would interfere with an unexpired patent, previously granted any person interested in any such patent, either by assignment or otherwise, in the one case, and any such applicant in the other case, may have remedy by bill in equity; and the court having cognizance thereof, on notice to adverse parties and other due proceedings had, may adjudge and declare either of the patents void in the whole or in part, and may also adjudge that such applicant is entitled, according to the principles and provisions of this act, to have and receive a patent for his invention as specified in his claim, or for any part thereof, as the fact or priority of right or invention shall in any such case be made to appear. And such adjudication, if it be in favor of the right of such applicant, shall authorize the Commissioner to issue such patent, on his filing a copy of the adjudication and otherwise complying with the requisitons of this act. *Provided, however*, that no such judgement or adjudication shall effect the rights of any person except the parties to the action and those deriving title from or under them subsequent to the rendition of such judgment.

Sec. 17. *And be it further enacted*, That all actions, suits, controversies, and cases arising under any law of the United States granting or confirming to inventors the exclusive right to their inventions or discoveries, shall be originally cognizable, as well in equity as at law, by the circuit courts of the United States, or any district court having the powers and jurisdiction of a circuit court, which courts shall have power, upon bill in equity filed by any party agrieved in any such case, to grant injunctions according to the course and principles of courts of equity, to prevent the violation of the rights of any inventor as secured to him by any law of the United States, on such terms and conditions as said courts may deem reasonable; *Provided, however*, That from all judgments and decrees of any such court rendered in the premises, a writ of error or appeal, as the case may require, shall lie to the Supreme Court of the United States, in the same manner and under the same circumstances, as is now provided by law in other judgments and decrees of circuit courts. and in all other cases in which the court shall deem it reasonable to allow the same.

Sec. 18. *And be it further enacted*, That there shall be provided for the use of said office, a library of scientific works and periodical publications, both foreign and American, calculated to aid and facilitate the discharge of the duties hereby required of the chief officers therein, to be purchased under the direction of the Committee of the Library of Congress. And the sum of ——dollars annually is hereby appropriated for that purpose, to be paid out of the patent fund.

Sec. 19. *And be it further enacted*, That it shall be the duty of the Commissioner to cause to be classified and arranged, in such rooms or gallaries as may be provided for that purpose, in suitable cases, when necessary for their preservation, and in such manner as shall be conducive to a benficial and favorable display thereof, the models and specimens of compositions and of fabrics and other manufactures and works of art, patented or unpatented, which have been or shall hereafter be deposited in said office. And said rooms or galleries shall be kept open during suitable hours for public inspection.

Sec. 20. *And be it further enacted*, That all acts and parts of acts heretofore passed on this subject be, and the same are hereby, repealed: *Provided, however*, That all actions and processes in law or equity sued out prior to the passage of this act, may be prosecuted to final judgment and execution, in the same manner as though this act had not been passed, excepting and saving the application to any such action, of the provisions of the fourteenth and fifteenth sections of this act, so far as they may be applicable thereto.

FRAME BRIDGES.

The subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillilson,	St. Francisville, Lou's'a.
Capt. John Bottom,	Tonawanda, Penn.
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned is about to fix his residence in Rochester, Monroe country, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H. Long.

Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do cast steel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

☞ THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

TO CANAL CONTRACTORS.

SEALED PROPOSALS will be received at the Office of the Commissioners of the Illinois and Michigan Canal, from the 25th of May to the 6th of June next, for the construction of eight miles of the summit division of said Canal, extending from the point of commencement on Chicago River, to the Des Plains River; and also of six or eight miles of the lower end of said division, extending from the mouth of the Saganaskee Swamp down the valley of the Des Plains.

The work consists principally of deep excavation, a considerable portion of which is rock, and is well worthy the attention of contractors.

Plans, profiles, and specifications, giving all the necessary information to those wishing to obtain contracts on this line, may be examined at the Office of the Canal Commissioners, after the 25th of May next; and contractors are respectfully solicited to make a minute personal examination of the work previous to sending in proposals.

By order of the Board of Gommissioners of the Illinois Canal. Attest:

JOEL MANNING, Secretary to said Board.

N. B.—Any person wishing to procure copies of the above, on letter sheets, can obtain them by applying at the Canal Office.

Chicago, April 19, 1836. m6 t25

CHICAGO LOTS.

NOTICE is hereby given, that on the 20th day of June next, at the Town of Chicago, in the State of Illinois, the following described Property will be sold at Public Auction, to wit:

All the unsold Town Lots in the original Town of Chicago; and also the Town Lots on fractional Section No. Fifteen, in the Township No. Thirty-nine, North of Range Fourteen, East of the Third principal Meridian adjoining the said Town of Chicago. The sale will commence on the said 20th day of June, and will be continued from day to day, until all the Property has been offered for sale or disposed of. This property is held by the State of Illinois for canal purposes, and is offered for sale in conformity to the provision of a Statute Law of the said State, authorizing such a sale. The terms of sale are one-fourth of the purchase money to be paid in advance at the time of sale, and the residue in three annual instalments, bearing an interest of six per centum per annum, payable annually in advance.

Those who are unacquainted with the situation of the above mentioned Property, are informed that those Lots which are described as belonging to the original Town of Chicago, are situated in the best built and business part of the Town. Section Fifteen is a dry ridge, commencing near the harhor, and extending south, one mile, along the shore of Lake Michigan.

By order of the Board of Commissioners of the Illinois and Michigan Canal.

Attest, JOEL MANNING,
Treasurer to said Board.

Chicago, March 17th, 1836. 13—8t

PROSPECTUS

OF VOLUME II. OF THE

CHICAGO AMERICAN,

TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public.—The reasons that induced him about a year since to establish his weekly paper, operates with renewed and increasing force in favor of his present design.—He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wildnerness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

As a record of passing events, current literature, of the march of agriculture, commerce and manufactures, and especially of the progress of internal improvements, of which this State, by her recent passage of the act for the construction of the "Illinois and Michigan Canal," has commenced her great and auspicious system, it will aim, as ever, to be accurately and early informed, and thus endeavor to consult alike the tastes and wants of the community with which it is identified. With party, as generally understood, it will have as little to do as possible. Its politics will be the Constitution—its party, the Country.

With this brief explanation of its future course, and his thanks for the more than expected encouragement he has already received, the subscriber again ventures to solicit the continued patronage and extended support of all who may feel an interest in the principles here set forth.

It will be enlarged and otherwise greatly improved, and printed on superior paper, and forwarded to distant subscribers by the earliest mails, enveloped in a strong wrapper.

TERMS.—The AMERICAN will be published SEMI-WEEKLY, at $4 per annum, if paid at the time of subscribing; $5 if paid at the expiration of six months, or $6 if payment is delayed to the end of the year.

*** Any person procuring five subscribers and remitting the pay in advance, will be entitled to a sixth copy gratis, or a deduction of TEN PER CENT.

Persons at a distance remitting a $5 bill will receive the paper fifteen months.

*** All sums to the amount of $10 and upwards may be sent through the Post Office, at my expense.

THOS. O. DAVIS.

Chicago, March 25, 1836.

*** Subscriptions and Advertisements for the CHICAGO AMERICAN will be received at the Office of the Railroad Journal, 132 Nassau street, by

D. K. MINOR.

SMITH & VALENTINE,

STEREOTYPE FOUNDERS,

Are prepared to execute orders in their line,

at 212 Grand street, New-York.

HARTFORD AND NEW-HAVEN RAILROAD.

From New-Haven to Meriden, eighteen miles of this Railroad is now located, and is expected to be ready for contract about the 25th of May. The attention of contractors is invited to this work. A more definite advertisement of the time when proposals are to be received, will hereafter appear.

JAMES BREWSTER, Agent.

New-Haven, April 27, 1836. m16—3t

[Editors to whom this is MARKED, are repuested to give it three insertions, and send their bills to James Brewster, President Railroad Company,

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron. RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to

MR. EDWARD A. G. YOUNG,
Superintendent, Newcastle, Delaware.

feb 20—ytf

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J8 ROGERS, KETCHUM & GROSVENOR.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

RAILWAY IRON.

95 tons of 1 inch by		½	inch.		FLAT BARS in lengths
200	do	1¼	do	½	do of 14 to 15 feet, counter
40	do	1½	do	½	do sunk holes, ends cut at
800	do	2	do	½	do an angle of 45 degrees,
800	do	2½	do	½	do with splicing plates and
soon expected.					nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2¼, 2¾, 2¾, 3, 3¼, 3¼, and 3½ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds o Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

NEW-YORK AND ERIE RAILROAD.

TO CONTRACTORS.—Proposals will be received at the Engineer's Office of the New-York and Erie Railroad Company, in the village of Binghampton, on and until the 30th day of June next, for grading 69 miles of the Railroad, from the village of Owego, in Tioga County, to the village of Deposit in Delaware County.

Proposals will also be received at the Engineer's Office, in Monticello, on and until the 11th day of July next, for grading 48 miles of the Railroad through the county of Sullivan, extending from the Delaware and Hudson Canal up the valley of the Neversink, and thence to the mouth of the Callikoon Creek, on the Delaware River.

Plans and profiles of the line above mentioned, staked out in convenient sections, with printed forms of the contracts, will be ready for exhibition at the said offices twenty days before the days of letting above specified.

The Company reserve the privilege of accepting only such proposals as they may deem for their advantage.

New-York, 26th April, 1836.

15—tf JAMES KING, President.